

Advance Placement Biology Syllabus

2020-2021

Duo Wang

1. Course Description

AP Biology is a year-long course designed for high school students to prepare for the AP Exam that will be taken in May, and hopefully, to earn placement credit for an introductory college-level course. A college biology course differs significantly from the usual high school course in respect to the textbook used, the range and depths of topics covered, the laboratory work done by students, and the time and effort required. This course is aligned to the College Board AP Biology Curriculum Framework and is based on four big ideas, which encompass core scientific principles, theories, and provide a broad way of thinking about living organisms and biological systems. We will tie these four big ideas every single day in throughout the entire year:

Big Idea	Enduring Understanding
One The process of evolution drives the diversity and unity of life.	A. Change in the genetic makeup of a population over time is evolution. B. Organisms are linked by lines of descent from common ancestry. C. Life continues to evolve within a changing environment. D. The origin of living systems is explained by natural processes.
Two Biological systems utilize energy and molecular building blocks to grow, reproduce, and maintain homeostasis.	A. Growth, reproduction, and maintenance of the organization of living systems require free energy and matter. B. Growth, reproduction, and dynamic homeostasis require that cells create and maintain internal environments that are different from their external environments. C. Organisms use feedback mechanisms to regulate growth and reproduction, and to maintain dynamic homeostasis. D. Growth and dynamic homeostasis of a biological system are influenced by changes in the system's environment. E. Many biological processes involved in growth, reproduction, and dynamic homeostasis include temporal regulation and coordination.
Three Living systems retrieve, transmit, and respond to information essential to life processes.	A. Heritable information provides for continuity of life. B. Expression of genetic information involves cellular and molecular mechanisms. C. The processing of genetic information is imperfect and is a source of genetic variation. D. Cells communicate by generating, transmitting, and receiving chemical signals. E. Transmission of information results in changes within and between biological systems.

<p>Four</p> <p>Biological systems interact and these interactions possess complex properties.</p>	<p>A. Interactions within biological systems lead to complex properties.</p> <p>B. Competition and cooperation are important aspects of biological systems.</p> <p>C. Naturally occurring diversity among and between components within biological systems affects interactions with the environment.</p>
--	---

There are Eight Units in AP Biology. Each unit is broken down into topics. The pacing of these topics is in line with their weighting on the multiple-choice section of the AP Biology Exam.

Unit	Exam Weighting
Unit 1: Chemistry of Life	8-11%
Unit 2: Cell Structure and Function	10-13%
Unit 3: Cellular Energetics	12-16%
Unit 4: Cell Communication and Cell Cycle	10-15%
Unit 5: Heredity	8-11%
Unit 6: Gene Expression and Regulation	12-16%
Unit 7: Natural Selection	13-20%
Unit 8: Ecology	10-15%

Twenty-five percent of instructional time is devoted to hands-on laboratory work with an emphasis on inquiry-based investigations. Investigations require students to ask questions, make observations and predictions, design experiments, analyze data, and construct arguments in a collaborative setting, where they direct and monitor their progress.

2. Grading Scale

Attendance:	10%
Class contribution (Exit ticket etc.):	15%
Assignments:	20%
Laboratories/Quizzes:	25%
Mid-term& Finals:	30%
	100%

3. Requirements

1. Textbook: Campbell and Reece, *Biology*. 10th Ed.
2. Students will need to come prepared to class every day with reading/outlining done. A lecture class will include a mixture of PowerPoint lectures, discussion, and problem solving questions. Most lectures will include a discussion about how all things are evolutionary tied, where they fall in the development of phylogenetic trees, and how various topics relate to the 4 big ideas.
3. The non-laboratory classroom time will be a mixture of teacher lecture, student/teacher discussion, and practice in writing skills. Students will be given homework problems and

other activities to help master the information. These problems will be worked in class if requested.

4. On a quarterly basis, students will take a cumulative test to maintain prior topics. You may also be asked periodically to take vocabulary quizzes to keep terminology fresh in your mind.

4. Schedule

First Semester		
Time	Topic	Labs
3 weeks	INTRO/CHEMISTRY OF LIFE Chapter 1 Introduction: Evolution and the Foundations of Biology	AP Lab #13
	Chapter 2 Chemical Context of Life Chapter 3 Carbon and the Molecular Diversity of Life Chapter 6 An Introduction to Metabolism	Enzyme Catalysis Lab
2 weeks	THE CELL Chapter 4 A Tour of the Cell	AP Lab #4
	Chapter 5 Membrane Transport and Cell Signaling	Osmosis and Diffusion Lab
3 weeks	CELL PROCESSES Chapter 7 Cellular Respiration and Fermentation	AP Lab #6
	Chapter 8 Photosynthesis	Cellular Respiration Lab
		AP Lab #5 Photosynthesis Lab
2 weeks	CELL REPRODUCTION Chapter 9 The Cell Cycle	AP Lab #7
	Chapter 10 Meiosis and Sexual Life Cycles	Mitosis and Meiosis Lab
3 weeks	MENDELIAN GENETICS Chapter 11 Mendel and the Gene Idea	The Genetics of

	Chapter 12 The Chromosomal Basis of Inheritance	Fruit Flies Lab
5 weeks	MOLECULAR GENETICS Chapter 13 The Molecular Basis of Inheritance	AP Lab #8
	Chapter 14 Gene Expression: From Gene to Protein Chapter 15 Regulation of Gene Expression Chapter 16 Development, Stem Cells, and Cancer Chapter 17 Viruses Chapter 18 Genomes and Their Evolution	Bacterial Transformation Lab AP Lab #9 Restriction Enzyme Analysis Lab

Second Semester		
Time	Topic	Labs
3 weeks	EVOLUTION Chapter 19 Descent With Modification	AP Lab #3
	Chapter 20 Phylogeny Chapter 21 The Evolution of Populations Chapter 22 The Origin of Species Chapter 23 Broad Patterns of Evolution	BLAST Lab
1 week	PROKARYOTES Chapter 24 Early Life and the Diversification of Prokaryotes	Gram Stain Lab
2 weeks	PLANT STRUCTURE AND FUNCTION (optional)	
	Chapter 28 Plant Structure and Growth Chapter 29 Resource Acquisition in Plants Chapter 31 Plant Responses to Internal and External Signals	AP Lab #11 Transpiration Lab
4 weeks	ANIMAL STRUCTURE AND FUNCTION (optional) Chapter 32 Homeostasis and Endocrine Signaling	AP Lab #12
	Chapter 35 The Immune System Chapter 37 Neurons, Synapses, and Signaling Chapter 38 Nervous and Sensory Systems Chapter 39 Motor Mechanisms and Behavior	Animal Behavior Lab

3 weeks	ECOLOGY Chapter 40 Population Ecology and the Distribution of Organisms	AP Lab #10
	Chapter 41 Species Interactions Chapter 42 Ecosystems and Energy Chapter 43 Global Ecology and Conservation Biology	Ecosystem Energy Dynamics Lab
2 weeks	REVIEW FOR AP EXAM	
Monday May 14th	COLLEGE BOARD AP BIOLOGY EXAM	
3 weeks	BIODIVERSITY UNIT	Simpson's
		Biodiversit y Index Lab